

Running head: VEHICLE DRIVING SIMULATION

## Vehicle Driving Simulation

A Possible Solution to Vehicle Crashes

Patrick J. Parker

Grand Traverse Metro Fire Department

## CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writing of another.

Signed:\_\_\_\_\_

### Abstract

The Grand Traverse Metro Fire Department [GTMFD] continued to see an alarming number of vehicular crashes and has embarked upon emergency driving initiatives. The department has written for a grant to purchase a simulator. The problem was the department has no guidelines for its implementation. The purpose of this research is to determine by descriptive research if vehicle driving simulation can reduce vehicle crashes in the GTMFD. The research questions ask how fire and non-fire organizations are using simulators to reduce crashes and what external and internal factors help or hinder the success of a simulation program. The procedures employed included a literature review, questionnaires, personal interviews and telephone interviews. The results found that fire and non-fire organizations have reduced crashes with simulation. Many factors can improve the chances of a simulation program's success. It was recommended that the GTMFD find any means possible to move this project forward. The department should seek out an interested lead instructor and develop a results oriented program.

## Table of Contents

	PAGE
Certification Statement-----	2
Abstract-----	3
Table of Contents-----	4
Introduction-----	6
Background and Significance-----	7
Literature Review-----	10
Procedures-----	20
Results-----	25
Discussion-----	30
Recommendations-----	34
References-----	37

## APPENDICES

Appendix A: GTMFD Post Accident Emergency Driving Safety Initiatives-----	39
Appendix B: Interview Questionnaire-----	40
Appendix C: US Army Interview-----	41
Appendix D: FDNY Interview-----	43
Appendix E: NY City Transit Interview-----	45
Appendix F: LAFD Interview-----	47
Appendix G: Clark County FD Interview-----	49
Appendix H: Max Jet Airways Interview-----	51
Appendix I: Great Lakes Maritime Academy Interview-----	53

Appendix J: MCTS Interview-----	55
Appendix K: Ventura County FD Interview-----	57
Appendix L: GTMFD Member Questionnaire and Results-----	59
Appendix M: Michigan Association of Fire Chiefs Questionnaire-----	62

## Vehicle Driving Simulation: A Possible Solution to Vehicle Crashes

### Introduction

The fire service continues to see an alarming number of crashes while responding to or returning from incidents. A National Fire Protection Association [NFPA] (2005) research study reports that in 2004, 15,420 vehicles were involved in crashes resulting in 980 firefighter injuries. Also in 2005, twenty-three firefighters died while responding to or returning from emergency incidents (United States Fire Administration [USFA], 2006). Because these statistics have not changed significantly in the past ten years, some fire departments have turned to vehicle driving simulation as a way to combat crashes and reduce injuries. The USFA also reports that crashes are the second leading cause of deaths of firefighters behind heart attacks and strokes.

The problem is that as a result of crashes, the Grand Traverse Metro Fire Department [GTMFD] has decided to create a vehicle driving simulation program without any guidelines as to its implementation. The purpose of this Applied Research Project is to identify if vehicle driving simulation could be used to reduce vehicle crashes in the GTMFD. The research will also determine how to successfully implement a vehicle driving simulation program.

This applied research project will use the descriptive research method using interviews, questionnaires, and literary research to explore the role that simulation can play in reducing crashes and its successful implementation. This research will answer the following questions:

- (1) How are non-fire organizations using simulators in their operations?
- (2) How are fire departments using simulation to reduce crashes?

(3) What external factors would help or hinder the success of a vehicle driving simulation program?

(4) What internal factors would help or hinder the success of a vehicle driving simulation program?

The results of this Applied Research Project will be of great value to the GTMFD as it implements programs to reduce crashes within the department.

### Background and Significance

The Grand Traverse Metro Fire Department is located in Grand Traverse County in the northwest lower peninsula of Michigan. The GTMFD serves the townships of Acme, East Bay and Garfield which encompass 95.3 square miles. These three townships circle the southern boundary of the major city of Traverse City. The US Census Bureau, Census 2000, reports a total population of the three townships to be 28,091. Because of Lake Michigan, the many inland lakes and countless recreational opportunities, the area is a popular tourist destination both summer and winter.

The GTMFD is a combination department. The career staff consists of administration and fire prevention bureau staff of ten, while the suppression staff of sixty-three is part-paid. The department responded to 2289 calls in 2005 out of three stations. A vacant industrial building is being renovated for a fourth station. An aggressive strategic plan is being implemented which will improve customer service to the constituents of the three townships.

On March 8, 2005 an incident changed the GTMFD forever. A fire engine from Station 11 of the GTMFD was en route to a mutual aid call for smoke in a restaurant. While under lights and sirens, the truck proceeded against a red light and struck the

Matthew and Rebecca Garrisi family Chevy Blazer. Killed were Rebecca Garrisi and their 11 month old son, Jesse. The driver of the fire engine was 26 year old Cory Carlton, a 5 year part-paid employee who was not hurt.

The fire department was sued civilly for negligence in training employees. The lawsuit read that the department allowed employees to operate vehicles in a careless and negligent manner. After a year of lawsuits and court proceedings, the fire department and its insurer settled with the Garrisi family for \$2.215 million. The department also agreed to revise its policy in relation to intersection travel and to require mandatory drivers training every two years. The fire engine was sidelined for over fourteen months.

GTMFD firefighter Cory Carlton was charged with two counts of negligent homicide. He later plead to a traffic misdemeanor of failing to slow for safe operation through a red light. Mr. Carlton also was required to perform 100 hours of community service and resign from the department.

Four months later on July 13, 2005, a GTMFD Station 9 tender was wrecked after the driver lost control on an s-curve road while en route to a wildland fire. The tender was considered a total loss. The driver was shaken but not hurt badly.

The GTMFD took these matters seriously. The department realized that if it did not change its policies and programs, that it could foresee future crashes resulting in fatalities and out of service vehicles. Initial quotes for fleet and liability insurance for 2007 are estimated at a possible 60% increase. The department became very passionate in eliminating future accidents and changing attitudes and behaviors. The department embarked upon the implementation of eight emergency driving initiatives (see Appendix A for a listing of the initiatives). The immediate change was to stop at all controlled



intersections before proceeding. The department also implemented mandatory drivers' training. One initiative that the department thought could have a huge impact was vehicle driving simulation.

The department contacted FAAC Inc. [FAAC] of Ann Arbor, MI. FAAC had recently installed vehicle driving simulation to the Los Angeles Fire Department as well as the Fire Department of New York. FAAC has been providing simulators to the military for years.

In 2006, the Assistance to Firefighters Grant [AFG] Program allowed the application of vehicle driving simulators (USFA, 2006). The guide allowed training funds to be used for the purchase of equipment such as simulators and trailers.

The GTMFD wrote a grant for \$156,000 for the purchase of a vehicle driving simulator. The GTMFD is anticipating this award, but the department has no implementation plan in place. The department also does not know if simulation will actually reduce crashes in the fire department setting. This applied research project [APR] will answer these questions.

This APR is directly related to the National Fire Academy's [NFA] Executive Development course. The Organizational Culture and Change module taught that being part of an adaptive leader is to recognize the indicators that point to a legitimate need for an organization's culture to change (USFA, NFA, 2006).

The problem that this APR will discover is related to the United States Fire Administration's mission to reduce firefighter fatalities by 25 percent in 5 years (USFA, 2006). If a fire department can reduce accidents, it will reduce its probability that one of those accidents could turn into a Line of Duty Death.

## Literature Review

A literature review was conducted to analyze the existing body of knowledge on vehicle driving simulation. The literature review of fire related publications did not produce much information. Much of the information in the review was found in industry publications, technical and government reports. Personal interviews with subject matter experts revealed the most pertinent information.

It is common knowledge that sports teams, the military and aircraft pilot training have been preparing for disasters by simulating scenarios. It affords these individuals the opportunity to get acquainted with realities that provide them an avenue to test reflexes and responses. This is where the adage “practice makes perfect” comes into place (Desouza, 2004).

Industry, the military and governments have been using vehicle simulators in recent years. The airline industry has been using simulation for many years.

The airline industry uses virtual reality simulators almost exclusively for their pilot training. The flight simulators replicate the controls and movement of a commercial airliner. Mr. Galton of Max Jet Airways reported that the first time a pilot flies the actual aircraft is for his check ride, the second time is with paying passengers on board (C. Galton, personal communication, August 21, 2006). Prior to this, all flying of that airline was conducted in a simulator. Mr. Galton said that in his training, they simulate what they can't do in the air such as engine failure, fires, loss of hydraulic pressure, loss of gear, and loss of cabin pressure. The airline industry has placed a high level of confidence in this type of training.

The Great Lakes Maritime Academy in Traverse City, MI, has been training cadets for jobs at sea. The cadets practice simulated navigation on the Great Lakes, rivers, and ports. Students must prepare a passage plan and are then tested on the simulator. River and harbor traffic is also simulated to add realism to the scenario. Because crashing a real-life freighter would be catastrophic, students must pass two simulator courses before being allowed behind-the-wheel of a real-life ship (R.L. Mason, personal communications, September 1, 2006).

Airports such as Minneapolis-St Paul International (MSP), Detroit Metropolitan, Chicago O'Hare, and Toronto Pearson International have been using vehicle driving simulation as a tool to train ground based drivers on how to maneuver on the airport grounds. At MSP, aircraft rescue and firefighting crews train on an Oshkosh T-3000 which actually simulates aircraft fires and how to fight them. First responders see a simulated airport environment complete with modeled behavior for fires and victims (Croft, 2005).

The military has been training soldiers on how to fight a wide assortment of battles using simulation. Kauchak (2006) states that the military is increasing their investment in vehicle driver simulators. Recent casualties in operations Iraqi and Enduring Freedom were caused by vehicle crashes in non-hostile conditions. Increasing fuel prices and a diminishing inventory of available vehicles are also factors for simulation.

A Department of Army report by Pishel & Rose (2000) shows how simulation can produce efficient learning, faster training times, reduced accidents rates and improved fuel economy. Results prove that simulators provide intensive learning that can be

repeated. The study reports that simulation training is three times faster than traditional methods, and results in a 22 percent reduction in accident rates and 10 percent improved fuel economy. In fact groups that trained in the simulators often did better than those trained in actual trucks.

Training Management Specialist John Ritter of the Army Training Support Center at Fort Eustis, VA concurs with the Pishel & Rose study (J. Ritter, personal communication, August 30, 2006). Ritter claims that the Army simulates all forms of transportation from trucks to cranes to trains. Simulation is required of a soldier and proficiency must be proven before he/she is allowed to operate a vehicle. The Army is able to train a soldier where safety would not allow some maneuvers in the real world. These maneuvers are such things as black ice, blow-outs, and night driving.

The transit bus operators have seen advantages with the use of vehicle driving simulators. Brock, Jacobs, and Buchter (2001) found in their study that there was a 92 percent level of satisfaction from respondents. Those same respondents also reported that 58 percent felt that simulation was more effective than traditional training methods. Student bus operators can be trained more efficiently and more effectively using simulation. Brock, Jacobs, Van Cott, McCauley, and Norstrom (2001) also found that simulation enhances learning, and reduces cost of training.

Louis Maiello, the Superintendent of Simulation Training for the NY City Transit, has over 5,500 buses and 9,000 employees. Every bus operator has been on their simulators. He claims that it would be impossible to accomplish their training needs without simulation. Maiello states that their top accident problems change every year

because they stop having accidents through simulation. They have seen a 33% drop in their accidents (L. Maiello, personal communication, September 5, 2006).

The trucking industry is using simulation extensively and it is showing a safety return on investment. Kelly (2006) writes that simulation has improved driver performance. Drivers have shown a reduction in reportable and preventable accidents. Bison Transport found that after simulator training for preventable accidents, their days between crashes improved to 793 days from 432 days, an 83% improvement. Schneider National has lowered their accident frequency and severity by as much as 20%.

The Federal Motor Carrier Safety Administration [FMSCS] and the National Highway Traffic Safety Administration [NHTSA] studied the cause of truck crashes (Avery, 2006). The results of this study found that the critical reason for crashes were driver related 87 percent of the time. These crashes were from two types of errors- decision and recognition. Decision errors included driving too fast for conditions, speed, following too close, and making assumptions about the other driver's actions. Recognition errors result from inattention or distractions. The trucking industry is turning towards technology to improve safety.

The literature review has found that just about everyone in some way or another is using scenario based simulation. Those organizations that have simulators are using vehicle driving simulation to great success. This success is seen in fire department applications.

A review of NFPA 1451, Standard for a Fire Service Vehicle Operations Training Program calls for annual driver training, but not less than twice each year. Part 5.2.2 of the standard calls for hands-on exercises, but excludes virtual reality driver simulation

(NFPA, 2002). The appendix part 5.2.1 of the standard allows drivers training with the use of vehicle driving simulators as long as it does not exclude twice a year hands-on training (NFPA, 2002).

Rob Raheb (2005) Lieutenant, Paramedic and Emergency Vehicle Operator Instructor with the Fire Department of New York [FDNY] has attributed the use of simulators with a reduction in collisions. The FDNY has seen a reduction in overall collisions by 12 percent and a 38 percent reduction in intersection collisions. Raheb says his students identify common situations and learn to make proper decisions before they occur. Raheb states, “Actual vehicle training develops a student’s precision-driving skills, while simulation training develops decision-making skills.” (p. 74). Simulation plays a part in FDNY’s overall Emergency Vehicle Operator’s Course [EVOC]. Simulation enhances the actual vehicle training.

Because most of FDNY’s employees come from a very diverse population, most have zero driving experience or own vehicles. EVOC and simulation allow for mistakes to be made in the simulator rather than expensive or dangerous mistakes in an actual rig (R. Raheb, personal communication, September 1, 2006). Raheb states that if they can’t get it right in a simulator, then they are not employed with the FDNY.

Much is the same with the Los Angeles Fire Department [LAFD]. Captain Frank Espinosa, a driving training instructor with the department, reports that simulation plays a big part of their 16 hour EVOC program (F. Espinosa, personal communication, September 7, 2006). The LAFD can give real life training that one cannot replicate on a skid pad, such as blow outs, braking, and environmental. Captain Espinosa claims that

crashes are down due to simulation. The program is new as of February 2006, so there are no trends yet.

Clark County Fire Department in Las Vegas has found that they have had a two year drop in accidents, which they feel is due to simulation (M. Johnson, personal communication, October 16, 2006). Mr. Johnson feels that multi-tasking is one of their department's worries when operating a fire vehicle. During simulation, Clark County trains their operators to focus on the task at hand by throwing "confliction" into the scenarios. Their Code 3 simulation scenarios could not be duplicated in the real world without being on an actual run.

Captain Tom Glauser (T. Glauser, personal communication, October 16, 2006), driver trainer with the Ventura County FD in California uses simulation as a part of their drivers training program. Their focus is on good decision making. Again, Ventura County FD sees their simulation training as an adjunct to real live Code 3 driving.

Most external factors that help or hinder a successful simulation program are space and cost. The cost of simulators range from a low of \$158,000 (D. Basch, personal communication, August 10, 2006) to the cost of a full-flight simulator for a military aircraft is tens of millions of dollars that Brock, et al. (2001) found. Most fire departments budgets cannot support this kind of expense. Writing grants is an option as the GTMFD has done. Darren Basch, public safety account executive from FAAC reports that three to four year leases are available.

Simulators must be located in a building or room conducive for learning. John Ritter with the US Army Training Support Center (J. Ritter, personal communication, August 30, 2006), explained that the size of most simulators need a large room or

building. As with most organizations, buildings are a premium with the Army as with most fire departments.

The Clark County FD has found that a room with a temperature of 75 degrees is conducive to learning (M. Johnson, personal communication, October 16, 2006), while the LAFD keeps theirs at 65 degrees (F. Espinosa, personal communication, September 7, 2006).

As with all projects, support from the top is a must. Captain Glauser with Ventura County FD (T. Glauser, personal communication, October 16, 2006) has found that without simulation and drivers training being made a priority with the organization, the organization will not reap the results.

The literature review and interviews found numerous sources to answer what internal factors could help or hinder a successful simulation program.

Brock et al. (2001) found that a critical feature in the success of a simulator training program is the competence and enthusiasm of the instructional staff (Brock, et al.). This theme was constant in all of the personal interviews that this author conducted. Louis Maiello with the NY City Transit (L. Maiello, personal communication, September 5, 2006) concludes that his driver trainers must have the passion to train drivers. Mike Irwin with the Michigan Center for Truck Safety [MCTS] adds that the training instructor must be safety minded and also know the ins and outs of each scenario (M. Irwin, personal communication, August 4, 2006). Mr. Irwin goes on to say that the instructor must always present the simulation training as a challenge. Rob Raheb with FDNY claims that his program is successful because his instructors love what they do, and they all want to be there (R. Raheb, personal communication, September 1, 2006).



No literature or interviews reported instructor burn-out with the exception of the airline industry. M. Galton (personal communication, August 21, 2006) reports that his experience with instructors is that the work is tedious and the burn-out rate is high. They alternate instructors between simulation training and check rides.

A playback option of simulator programs shows students where mistakes were made and how their choice of driving decisions could have been handled differently (Raheb, 2005). Raheb also mentions that without this playback critique, the learning experience is lost. Rob Raheb in his interview (R. Raheb, personal communication, September 1, 2006) talks about playing back the scenario at the civilian point of view, to enable you to see what they see your vehicle doing.

The LAFD's simulation program also plays back their scenarios. Captain Espinosa explains (F. Espinosa, personal communication, September 7, 2006) that playing back the scenario frame by frame allows the student to learn from his mistakes.

The MCTS uses a three pronged approach to simulation training (M. Irwin, personal communications, August 4, 2006). Mr. Irwin uses instructor based training, computer based training and a set of simulation scenarios developed specifically for the learning objectives. A blend of all three is what he calls the "training sweet spot." Mr. Irwin and the military (J. Ritter, personal communications, August 30, 2006) had the only programs that institute a computer based training module before simulation. These two programs must have a passing grade on the lecture as well as proficiency on the computer before being allowed on the simulator. Most programs that were searched use objectives based training. Mr. Irwin uses the "PAFI" acronym for his program development. PAFI stands for:

1. Perceive the problem.
2. Analyze the problem.
3. Formulate a solution.
4. Then initiate a program.

Simulation training must have a purpose. Captain Espinosa of LAFD has 15 different scenarios on which they regularly train (F. Espinosa, personal communication, September 7, 2006). Captain Espinosa can also replicate an accident as a learning scenario. Bob Mason with the Great Lakes Maritime Academy (B. Mason, personal communication, September 1, 2006) claims that every training event must have a specific goal in mind.

Raheb (2005) writes that his program is based on three premises:

1. Skills: Students must demonstrate aptitude.
2. Knowledge: Students must possess knowledge of vehicle dynamics, physical forces, department policies and laws.
3. Attitude: A student without the proper attitude will inevitably cause a collision.

No literature was found that simulation was used alone for operator training except the airline industry (C. Galton, personal communication, August 21, 2006), which uses simulation exclusively for pilot training.

Many authors reported that a negative of a simulation program was the attitude of students. Most research from personal communications and literature found that simulation training must be taken seriously. The NY City Transit has found (L. Maiello, personal communications, September 5, 2006) that a proper indoctrination program is a

must, and without it they don't drive the simulator. The trucking industry teaches that a simulator is not a video game, there is not a slot for quarters and there is no bonus round (M. Irwin, personal communication, August 4, 2006). J. Ritter (personal communication, August 30, 2006) handles over confident students by humbling them in the simulator by changing the scenario. All simulator programs researched have a feature to modify the scenario to handle "problem or cocky" students.

A disadvantage of simulator training is that only one student at a time can use the device (Brock, et al.). Only the military has the resources to invest heavily into simulation. John Ritter from the Army Training Center reports that at Fort Leonard Wood alone they have over 32 Marine simulators and 52 Army simulators. The building alone cost over 15 million dollars (J. Ritter, personal communication, August 30, 2006).

Every interview and reviewed literature report that a significant negative to simulation training is motion discomfort or simulator sickness. Brock et al. (2001) notes that simulator sickness is an unwanted side effect.

"Your eyes tell you that you are moving through the scene. Your vestibular system tells you that you are stationary" (p. 17).

The Brock et. al. (2001) study claims major contributors to this susceptibility of motion sickness were:

1. The driving task.
2. Duration of exposure.
3. Simulator engineering and design.
4. Introduction and use of the simulator.

Brock et al. (2001) found that short sessions less than 10 minutes, mild and infrequent turns, and braking will reduce the symptoms of motion sickness. Rural rather than urban settings reduce visual flow of scene content.

To reduce motion sickness, the MCTS only allows a maximum of 15 minutes on the simulator (M. Irwin, personal communication, August 4, 2006). To reduce sickness even further, the instructor does not allow other students to watch someone else's event. It too can add to motion sickness when it is their turn on the simulator. The NY City Transit's program overcomes simulation discomfort by reducing excessive over steer, speed, and reducing fixed stare (L. Maiello, personal communication, September 5, 2006).

Technology changes are improving the refresh rates of the video, which account for less simulator sickness (M. Irwin, personal communication, August 4, 2006). Mr. Irwin also recommends budgeting for technology changes and software support. The MCTS is planning on replacement of their plasma TV's every eight years.

### Procedures

The research methodology utilized for this applied research project was of the descriptive research method. The desired outcome of the research would answer the question if vehicle driving simulation could reduce crashes in the GTMFD. These procedures would answer four questions about simulation and its uses in non-fire applications and fire applications. The research would also answer what external and internal factors would help or hinder a successful simulation program.

The research procedures used in preparing this APR began with a literature review at the NFA's Learning Resource Center in May 2005 while attending the

Executive Development course. This course started the process of selecting a problem statement and defining a purpose statement. Additional literature reviews were conducted at the Traverse City Public Library, on the internet, through industry journals, personal interviews, and telephone interviews.

Two questionnaires were developed. One given to the author's own department and one given to various fire departments across the State of Michigan.

This author's first experience with simulation began with his employment in the trucking industry. Simulation had made inroads with the trucking industry and driving simulation had been viewed at tradeshow. The author was a governor appointee to the Michigan Truck Safety Commission [MTSC]. The Commission awarded a grant to the MCTS whose primary mission is to improve truck safety by providing effective educational programs.

While a commissioner, the author was privileged to obtain information on simulation as an alternative to the MTSC's skid pad in Marshall, MI. Many truck-driving schools had also shown an interest.

After leaving the commission and the trucking industry, this author had kept contact with Mr. Jerry Basch who was a past commissioner and Safety Director with AAA Insurance of Michigan. While having lunch during the summer of 2004, Mr. Basch informed this author that his son, Darren, was an executive at FAAC, a provider of fire truck simulators. A following meeting and subsequent Michigan Association of Fire Chiefs trade show introduced fire truck simulation by FAAC personally to the author. FAAC also held a simulator open house at the GTMFD's administrative office.

A literature review resulted in three manufacturers of fire truck simulation. These manufacturers are FAAC, L3, and Doran Precision Systems. Contact was made with Darren Basch with FAAC, Jim Naatz of L3, and Larry DeMayo with Doran. Each manufacturer was asked for names of simulator programs. Both Mr. Naatz & Mr. DeMayo collaborated that FAAC leads the industry in fire driving simulation.

Interview questions (see Appendix B) were developed to answer the four APR's questions. Questions were developed after extensive literature review on the topic. The same questions were asked of non-fire organizations as well as fire organizations. Interviews were either conducted in person or by phone. The interviews answered the questions of how each organization was using simulation and whether simulation was positively affecting their organizations. The interview form asked procedural questions and concluded with questions on pros and cons of a successful program.

Mr. Basch introduced the author to contacts at the US Army, FDNY, NY City Transit, and LAFD (see Appendices C, D, E, & F). Mr. Naatz gave the author a contact at Clark County FD (see Appendix G). Mr. DeMayo of Doran has simulator programs in transit bus, but is a new entrant into fire truck simulation. Doran's contact in fire is Montgomery County Fire and Rescue, Montgomery County, MD. As the program is in its initial stages of implementation, no pertinent information could be obtained.

A personal interview was granted by Chris Galton of Max Jet Airways. Mr. Galton is a personal acquaintance of the author (see Appendix H).

A personal interview (see Appendix I) was granted by Bob Mason of the Great Lakes Maritime Academy [GLMA]. The GLMA trains cadets who will hold deck

positions aboard Great Lakes and ocean faring vessels. A previous open house of the campus led this author to the knowledge that they used simulation in their training.

Because of the author's previous association with the MTSC, the author knew Mr. Irwin, the project director of the MCTS. Interview questions were asked of Mr. Irwin (see Appendix J).

Finally, the author's ARP evaluator Linda Willing gave a lead to contact Ventura County Fire Department (See Appendix K).

A questionnaire was developed (See Appendix L) and given to the author's department during the month of August, 2006. All GTMFD members are drivers of its apparatus. The intended use of the questionnaire was to see what the department's attitude was towards vehicle driving simulation. By knowing your audience, a program could be tailored for ultimate success. As most of the suppression members are part-paid, the author gave the questionnaire to the three station chiefs for their distribution and return. The questionnaire had a return rate of 75 percent with 47 out of a possible 63 returned.

Initially, the questionnaire asked for demographic information. Later questions asked for department members' thoughts on vehicle driving simulation as a tool for a comprehensive driving program. Members were asked if vehicle driving simulation was made part of the GTMFD's driver training program, how it should be structured.

The author attended the annual Michigan Association of Fire Chiefs [MAFC] in Bay City, MI. The conference was held August 23-25, 2006 at the Double Tree Hotel. There were 110 attendees from nearly 100 Michigan fire departments. A questionnaire was developed (See Appendix M) and was distributed to a random sampling of twenty

fire departments present. Care was given to sample career, paid-on-call, and combination departments. The questionnaire asked for demographic information and asked if vehicle driving simulation was a part of their driver training program. Questions were asked to determine if a vehicle driving simulation program was provided regionally, would they use it and would they help defray the cost of such program. A question was asked if these departments knew that simulation was a qualified program of the 2006 AFG grant process.

Mrs. Lorna Meis of Tustin, MI was contracted to proof this ARP for grammar and punctuation errors. Mrs. Meis has a masters degree in English and was an instructor and counselor for the Pine River School District in Michigan.

#### Limitations

The interview questions and both questionnaires assumed that the individuals were able to understand the questions. A second assumption was that the individuals would answer the questions in a truthful and honest manner.

A limitation is that there are possibly other fire department simulation programs that the author does not know about. Another limitation is that there are numerous industries that are using simulation that the author did not interview or reference in the literature review.

The MAFC questionnaire was limited to departments that are members of the MAFC and are located in Michigan. The MAFC is the only known fire chief association in the State of Michigan. It is assumed that with there would be a correlation between a Michigan fire department and a fire department across the nation for vehicle driving



simulation program. No departments from the Upper Peninsula of Michigan attended the conference.

No research was found that shows simulation in a negative light. Most programs success is based on the internal controls put in place.

### Results

The results of this APR were compiled from the literature review, interviews, and questionnaires. These procedures were completed to answer the four research questions. The results and findings are listed here in a concise and narrative form.

The research found numerous non-fire organizations using driving simulation to reduce crashes and improve training efficiency. As was assumed, the airline industry has been and continues to use simulation exclusively for aircraft operations. Their belief in simulation is so great that the first time flying an actual aircraft is for their check ride, the second time is with paying passengers onboard.

All forms of transportation from maritime, trucking, transit bus, and airport ground operations are using simulation. These organizations have found that their accidents have been reduced due to simulation. All found that it is cost efficient to simulate their driving operations. Mistakes can be made on the simulator that could cause catastrophic accidents on the roads or waterways.

The United States Army is using driving simulation for all forms of transportation. Any vehicle movement on a base by a vehicle is simulated (J. Ritter, personal communication, August 30, 2006). A soldier must show proficiency on the simulator or they are not allowed to drive the actual vehicle.

Fire Departments are slowly moving towards simulation. Research found only four departments using simulation extensively and one upstart program. Of the four fire departments interviewed, all four are large city or county departments. All are using driving simulation as part of their initial driving or EVOC programs. No fire department researched is using simulation as their exclusive training tool, but as an adjunct to actual behind-the-wheel training. Clark County FD, LAFD, and FDNY all feel that simulation has caused a drop in their accidents. FDNY (Raheb, 2005) has reduced all accidents by 12% and intersection collisions by 38%. Of the four departments interviewed, all felt that vehicle driving simulation helped in decision making skills.

The fire department programs are slowly instituting programs for their existing drivers. Drivers that may have a behavior or attitude problem can be checked on the simulator. FDNY reviews accidents and actually re-creates the accident on the simulator. This gives the driver a learning tool on what went right or what went wrong.

All of the departments researched, agree that simulation allows them to practice maneuvers that could not be replicated in the real world. Life safety concerns as well as the economic cost make simulation a valuable tool for these departments. Code 3 or running lights and sirens only can be practiced in real-life while actually responding to a call. Simulation allows that to be replicated in a simulator long before the real call happens.

A literature review and a questionnaire were developed to answer the question of what external factors help or hinder a successful driving simulation. Results all point to the cost of a simulator program as being the number one reason an organization has a

program or not. A building or space for a simulator was the next reason. Results from the MAFC questionnaire (Appendix M) concurred with these findings.

The following 20 fire departments completed the survey:

Bay City	Career	55 Members
Madison Heights	Career	36 Members
Mason	Combination	31 Members
Davison-Richfield	Paid-on-Call	35 Members
Clio	Paid-on-Call	60 Members
Midland	Career	45 Members
Saginaw	Career	63 Members
Ypsilanti Twp.	Career	35 Members
Howell	Combination	86 Members
Manistee	Career	8 Members
Charlevoix	Combination	35 Members
City of Portage	Combination	54 Members
East Tawas	Paid-on-Call	28 Members
City of Walker	Combination	60 Members
Windsor Twp.	Combination	61 Members
Burton	Paid-on-Call	66 Members
City of Kentwood	Combination	63 Members
Cherry Grove	Paid-on-Call	22 Members
Kochville Twp.	Paid-on-Call	25 Members
Plainfield	Combination	61 Members

Six departments were career, eight were a combination department, and six were paid-on-call department. All twenty departments have a driver-training program, but none have a driving-simulator program. When asked why they do not have a simulator program, all twenty responded cost as the reason. Three responded that they did not have the room for a simulator. Six did not know of a program available to them. All respondents positively answered that they would participate in a driving simulator program if one was offered regionally. All but two departments responded that they would help defer the cost of a regional program. All but two departments felt that a driving simulation program would benefit their department, while two did not know. On the question of whether these departments knew that vehicle-driving simulation was a qualified project of the 2006 AFG grant, 30 percent knew and 70 percent did not know.

Research found that there were a number of internal factors that help or hinder a successful simulator program. Literature review and personal interviews found that you must have a goal in mind with your program. Vehicle Driving Simulation is not a video game; its use should be taken seriously. A proper introduction and indoctrination to the program contributed to its success. Students must take the training seriously and their attitudes assessed.

A successful driving program should combine classroom, hands-on behind-the-wheel training, and simulator training. Having a positive and enthusiastic instructor helps a simulator program. These instructors keep the learning process a positive one.

Motion sickness is a factor that hinders a program. Limiting the time on the simulator, the maneuvers, and temperature of classroom are factors that can limit motion sickness. Research found that a student should limit his/her time on the simulator to 15

minutes. Maneuvers that require heavy braking, turning, and speed contribute to motion discomfort. Two fire departments found that their classroom should be kept in the 65-75 degree range.

The continuing cost of maintaining technology is a factor that could hinder a program. Research found that monies should be set aside for new hardware and maintenance on software.

Results of the GTMFD member survey (Appendix L) also answered the question of what internal factors could help or hinder a successful simulation program. Of the 63 surveys distributed, 47 were returned for a return rate of 75%. These 47 staff members comprised the sample for this study. The group consisted of 44 male and three female. Thirty-three percent of the respondents were current officers with the department. The participants were divided fairly equally among age groups. Thirty-two percent claimed to have used a vehicle driving simulator besides video games. On the question of whether simulation is an effective way to train for drivers training, 64% responded yes, 13% responded no, and 23% did not have an opinion. Of the respondents queried, 94% felt that a combination of classroom, hands-on behind-the-wheel, and simulation would be effective for training. On the question of whether simulation should be mandatory if a program was instituted, 68% said yes, 15% responded no, and 17% did not have an opinion. Twenty two respondents felt that one should train on the simulator once a year. It was felt by 87% of the respondents that every driver should be mandated to train on the simulator. When asked how long the sessions should be on the simulator, answers ranged from 11% for more than one hour, 36% for one hour, 32% for one half hour, 2% for 15 minutes and 19% had no opinion. On the question of whether only new or problem

drivers should be trained on the simulator, 87% felt that every driver should train on the simulator.

The above results looked at the sample in total. No statistical anomalies were found when comparing the results based on length of service, age, sex, or officer status with the department.

### Discussion

The results of this study clearly indicate that vehicle driving simulation can reduce crashes. The FDNY has seen overall collisions reduced by 12% and has seen a reduction in intersection collisions by 38% (Raheb, 2005). The NY City Transit has seen a 33% reduction in accidents (L. Maiello, personal communication, September 5, 2006). The Department of Army has seen a 22% in their accident rate due to simulation (Pishel & Rose, 2000). Avery (2006) reported that two motor carriers in the trucking industry have seen reductions in accidents. Bison has seen their meantime between accidents improved by 83% and Schneider National has seen a 20% reduction in accident frequency. The common denominator is that all of these organizations are using vehicle driving simulation.

Vehicle-driving simulation has become an acceptable training tool. A study by Brock, Jacobs, Buchter (2001) found that there was a 92% satisfaction rate of participants. All of the personal communication also found that employees have accepted driving simulation. Of the fire departments queried in the MAFC questionnaire (Appendix M) all but two felt that vehicle driving simulation could be a benefit to their department, two did not have enough information. The GTMFD questionnaire (Appendix L) found that 64% felt that simulation would be an effective way to train. The author

feels that the 23% that responded “no opinion,” based their answer on the fact that they know nothing about vehicle driving simulation.

All of the organizations are using simulation as an adjunct to their behind-the-wheel training. Simulation enhances that training. High risk maneuvers are better suited to the safety of a simulator than outside in an actual rig. The cost of vehicle repair and the potential for injuries makes simulation a better bet. A collision caused during a training exercise could cause catastrophic results. Mistakes on the simulator can be replayed, and the student can see how his decisions could have changed the outcome. Maneuvers such as black ice, tire blow-outs, and skids are almost impossible to simulate in real life.

Of the organizations researched, all are using classroom, actual driving and simulation in conjunction with each other. Only the military (J. Ritter, personal communication, August 30, 2006) and MCTS (M. Irwin, personal communication, August 4, 2006) use a middle step in their training. That middle step is computer based training. Once the student learns the lesson in the classroom, he/she becomes proficient on a computer skills session and then moves on to the simulator. While this makes sense, the cost of computers and program development costs may be prohibitive to many. The GTMFD survey (Appendix M) found that 94% of the respondents felt that a combination of behind-the-wheel and simulation would be their choice for drivers training.

Research found that a simulation program must have a goal in mind and be objectives based. Raheb (2005) bases his program on testing skills, knowledge, and attitudes. The MCTS program is based on perceiving the problem, analyzing the problem, formulating a solution, and then initiating a program (M. Irwin, personal communication, August 4, 2006).

Raheb (2005) with FDNY found that by simulating intersection accidents, they were able to reduce those by crashes by 38%. Louis Maiello with the NY City Transit found that their top areas of concern change yearly because simulation fixes those problems.

A proper indoctrination to the simulator accounted for better results. All personal communication found that it was imperative that simulator training be taken serious. The simulator was not a video game, and a problem student could be humbled quickly by the instructor.

Instructors need to be committed to safety and present the training as a challenge. A passion for training was often mentioned. If a student becomes over confident on the simulator, the instructor can humble a student by mixing up the scenario or by adding confliction.

Captain Glauser with the Ventura County FD (T. Glauser, personal communication, October 16, 2006) found that their organization has not made driving a priority and that is why their simulator program is not a priority. Ventura has no statistics on simulation. Of the other fire based simulation projects researched, all have statistics proving that simulation has reduced accidents. There was a feeling from the interviews, that these organizations took driving and simulation seriously.

Motion sickness was a common fault of the simulator. This phenomenon can be averted by limiting the time on the simulator to 15 minute sessions. High speed maneuvers, braking, and turning contribute the most to simulator sickness. A classroom temperature of 65-75 degrees adds to the factors reducing motion sickness.



The cost of a simulator was the common theme throughout the research on why organizations and fire departments are not using vehicle driving simulation. Simulation can range from \$158,000 to millions of dollars. The more realistic the simulator is, the more it will cost.

The GTMFD is awaiting its possible award of a vehicle driving simulator. It is the department's intent to locate the simulator at the Northwest Michigan Regional Training Center [RTC]. It could be used regionally by other fire departments. The MAFC questionnaire (Appendix M) found that cost was the single reason that these 20 departments did not have a simulation project. Of the 20 departments questioned, all responded that they would participate in a regionally located simulator. All but two, inferred that they would also help defray the cost of a regional simulator. Only 30% knew that vehicle-driving simulation was an allowed grant item in the 2006 AFG. Other Homeland Security needs of these twenty departments may dictate more operational type grant requests. All but two departments questioned felt that vehicle driving simulation could be a benefit to their organizations. The author speculates that, in most cases finding a department to take the lead for a regional project would be a daunting task.

A last thought is that if one could predict the behaviors leading up to an apparatus crash, a simulator could model countermeasures. The FMCSA & NHTSA study (Avery, 2006) found that the critical reasons for a truck crash were driver related 87% of the time. These crashes were from two types of errors, that of decision making and recognition. A firefighter responding to a fire or a rescue has no time to deliberate on how to respond. A firefighter's driving must be by instinct and it's usually done hastily. By addressing driver behavior in a simulator, crashes should be reduced. Rob Rahab (2006) of FDNY

EMS reduced his intersection crashes by 38%. The trucking industry has analyzed their crash data and has taken steps to reduce these. The fire service should do the same, and model that crash data into simulator scenarios.

Several implications for the GTMFD stem from the findings of this research. This author feels even more empowered to find every way possible to institute a simulator program. If the GTMFD is not awarded a simulator in the 2006 AFG grant, the department should work with surrounding departments to possibly apply again as a region or find a grantee that could sponsor a program. The GTMFD does not have an instructor who could run with this program. Between the awarding of the grant and the delivery of a simulator, this department would have to recruit a simulator instructor. There are costs that were not anticipated such as the type of classroom, the cost of maintaining the technology, and the cost of hardware obsolescence. Consideration must be given to future budgets. A potential user fee might need to be investigated. Arriving and returning safely is paramount for accomplishing the GTMFD's mission. A vehicle driving simulator is just the tool for reducing vehicle crashes.

### Recommendations

Based on this ARP, it is recommended that the GTMFD proceed with a vehicle-driving simulation program as its lead program to reduce crashes.

The GTMFD is anticipating the awarding of a vehicle driving simulator in the 2006 AFG program. Should this grant not come to fruition, the author should contact surrounding fire departments to apply for a future AFG grant as a regional project. Efforts should be made to find alternative sources of funding for this project. Grants should be written to other philanthropic organizations. The local Native American tribe is

another source, as they are required by Michigan law to share with the local community 2% of gaming revenues.

Additionally, a vehicle driving simulator committee should be instituted immediately to strategically plan for the future of the simulator project. Goals, objectives, and tasks for a successful program need to be engaged.

A search should ensue for an enthusiastic and positive educator to lead the instruction of the simulator project. A passion for driver's training is a characteristic and trait that should be looked for. Reimbursement for the instructor's time will be an issue that needs addressing. It is also recommended that the GTMFD send this instructor to visit fire-based simulation programs researched in this ARP. The author would also recommend visits with the NY City Transit as well as the MCTS in Lansing, MI.

It is recommended that a revenue and expense budget be created. There are hard and soft costs that will have to be considered in the GTMFD's future budget. After a realistic cost per hour is found, the GTMFD should look to partners in surrounding departments to help defray the cost of upkeep.

Once an instructor is found, it is recommended that the GTMFD work on a challenging and goal oriented program for the simulator. Analyses of the department's past crashes would be ideal models to create as simulator scenarios. A possible review of NIOSH fire department crash data could point the instructor to behaviors that could be simulated. Scenarios should be created that at least initially keep maneuvers simple so as to keep simulator sickness to a minimum. Once the student orients his/herself on the simulator, more difficult maneuvers could be instituted.

It was anticipated that the department would locate the simulator at the (RTC). Careful consideration needs to be given on the physical location and environment of the classroom. The classroom needs to be conducive for learning with comfort and temperature addressed.

A GTMFD department wide meeting should occur once the simulator program is in place and ready for students. This meeting would discuss the outcomes perceived and the necessity of buy-in for the program. From the results of the GTMFD study (Appendix L) it was found that there was positive interest in vehicle driving simulation. The department members will know that this program is a priority of the Chief and the GTMFD. The department will know that it is the goal of the department to never have a vehicle crash.

Future readers will find more data available as new simulator programs are currently in the process of implementation. Simulator vendors feel that there will be significant AFG simulator grants awarded. It is this author's wish, that future readers of this research will find that the USFA has accomplished their mission to reduce firefighter fatalities by 25 percent. Hopefully a large part of that reduction will be vehicular crashes.

Vehicle driving simulation can play a great part into changing attitudes and behaviors to accomplish the goal of no vehicle crashes. It is imperative that fire departments continue to address this issue. Not only will our community be safer, but our department members can truly live up to the fire service credo, "Everyone Goes Home."

## References

- Avery, A. (2006). What causes your crashes? *Commercial Car Journal*, 163(8), 52.
- Brock, J. F., Jacobs, C., & Buchter, R. (2001, August 14-18). Design of a guidebook for the acquisition and use of driving simulators for training transit bus operators. *Proceedings of the First International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design* (pp. 239-244). Aspen, CO.
- Brock, J. F., Jacobs, C., Van Cott, H., McCauley, M., & Norstrom, D. M., (2001). *Simulators and Bus safety: Guidelines for acquiring and using transit bus operator driving simulators* (Transportation Research Council TCRP Report 72). Washington, DC: National Academy Press.
- Croft, J. (2005, July). Taking the oops out of vehicle ops. *Atwonline*. Retrieved May 14, 2006, from <http://www.atwonline.com/magazine/article.html?articleID=1417>
- Desouza, K.C. (2004). Simulating disaster scenarios: A missing link in crisis management. *Disaster Recovery Journal*, 17(3), 56-59.
- Kauchak, M. (2006, February 15). Commonality boosts vehicle simulator. *Military Training Technology*, 11(1). Retrieved May 14, 2006, from <http://www.military-training-technology.com/article.cfm?DocID=1332>
- Kelly, S. (2006, May). More carriers are embracing simulators and other technology to improve driver training. *Commercial Car Journal* 163(5), 66-72.
- National Fire Protection Association. (2002). *Standard for a Fire Service Vehicle Operations Training Program* (NFPA 1451). Quincy, MA: NFPA.

National Fire Protection Association (NFPA) Fire Analysis and Research Division.

(2005, November). *U.S. firefighter injuries-2004* (pp 11-15). Quincy, MA:

Karter, M.J., Jr., & Molis, J.L.

Pishel, R.G. & Rose, R.L. (2000, May). *Driver skill trainer-Training effectiveness*

*analysis* (TRAC-WSMR-TEA-00-021, pp. iii-5). White Sands Missile Range,

NM: U.S. Department of the Army.

Raheb, R. (2005, August). Simulating emergency vehicle training. *Emergency Medical*

*Services*, 34(8), 74-79.

U.S. Fire Administration. (2006, February). *2006 Program guidance for the assistance to firefighters grant program* (p. 17) Emmitsburg, MD.

U.S. Fire Administration. (2006, July). *Firefighter fatalities in the United States in 2005*

(FA-306, p. 14). Emmitsburg, MD: Author.

U.S. Fire Administration, National Fire Academy. (2006). *Executive development student manual*. Emmitsburg, MD.

## Appendix A

### Post Accident Analysis Emergency Driver Safety Initiatives

1. **Review of Policy & Procedures.** Changed policy to stop at all controlled intersections.
2. **Annual Drivers Training (Mandatory):** This will be an awareness class and skills assessment. Every Metro driver must be checked off of Department apparatus yearly or they will not drive. This will also include POV training. We want to evaluate good driving attitudes and behavior checks on our drivers. Both strengths and weaknesses will be noted. Corrective action reports will be reviewed with each driver.
3. **Skid Pad:** This will be modeled after the Michigan Center for Decision Driving course offered in Escanaba & Marshall Michigan. The Michigan Truck Safety Commission in conjunction with the Michigan Center for Truck Safety offers the skid pad program to commercial drivers. We are working with Camp Grayling (National Guard) to set up a skid pad course there. Our drivers will learn decision driving techniques both in the classroom and in actual hands-on activities utilizing the skid course. Our drivers will fully understand proper stopping and skid control techniques that are unique to fire apparatus. We want our firefighters to know the limitations of their vehicles.
4. **The implementation of an Emergency Vehicle Driver Coaching Program:** This program is modeled after a program that Michigan State University originated. Currently the Michigan State Police use this program for all new recruits coming out of the academy. MSP calls it DPM or Driver Performance Measurement. This will be a one-on-one driver assessment over a predetermined route with an observer. This assessment is based on science and the observers review is objective based. The Center for Truck Safety is currently working on a 26 mile course in the Traverse City area. Department observers will have to attend a week long class. We are contemplating using third party observers outside of the department. This will be a pre-requisite for all new drivers.
5. **Emergency Vehicle Simulation:** We are currently working with FAAC Incorporated out of Ann Arbor, MI. ([www.faac.com](http://www.faac.com)) FAAC currently has sold fire truck simulation to the City of New York FD as well as LA County FD. We are working with them for a pilot simulation program in Michigan. Metro FD has had two meetings with FAAC and has trained on the simulator at the Michigan Association of Fire Chief's fall meeting. A meeting will be set up with our Risk Manager to see the possibility of underwriting this simulator for the Michigan fire service. We are looking at the possibility of housing this unit at our NW Michigan Regional Training facility here in Traverse City. An AFG Grant has been written.
6. **Review monthly information from the United States Fire Administration & the National Volunteer Fire Council:** The council has a program for Emergency Vehicle Safe Operations for Volunteer & Small Combination Emergency Service Organizations. Some items that we are looking at include Best practices in Emergency Vehicle Safety Self Assessment, backing Apparatus, Driver Qualifications, Intersection Navigation, Seat Belt Policy, and Vehicle Inspections.
7. **Convene an accident review board after all major accidents where there are any injuries and significant damage.**
8. **Follow NFPA 1451 Standard for a Fire Service Vehicle Operations Training Program as a guideline.**

## Appendix B

### Interview Questions for Industry and Fire Departments

Date:

Type of Interview:

Name of Organization:

Name of Interviewee:

Number of Employees:

Position with Organization:

Number of Stations/Plants:

1. How has simulation played a role in your organization?
2. Is simulation training required in your organization?
3. Do you have any statistics on reduction of accidents or injuries due to simulation?
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator?
5. What is the duration of your simulation training?
6. Can simulation change attitude as well as behaviors?
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees?
8. How did you choose your simulation vendor?
9. What is the cost of your simulation program?
10. What qualities do you look for in a trainer/instructor?
11. What are the positives of your simulation program?
12. What are the negatives of your simulation program?



## Appendix C

### Interview Questions for Industry and Fire Departments

Date: 8-30-06

Type of Interview: Phone

Name of Organization: Army Training  
Support Center-Fort Eustis, VA

Name of Interviewee: John Ritter

Number of Employees: Hundred Thousands

Position with Organization: Training  
Management Specialist

Number of Stations/Plants: Unknown

1. How has simulation played a role in your organization? *John is in charge of simulation development for all Army transportation devices, including watercraft, cranes, locomotives and all wheeled vehicles. With simulation, the Army is able to improve efficient learning, faster training times, reduced accident rates and improved fuel economy. With simulation the Army is able to train a soldier where safety would not allow some maneuvers and conditions in the real world. These are things such as black ice, snow, blow-outs, night driving.*
2. Is simulation training required in your organization? *Almost all forms of transportation are now simulated. Simulation is required before allowing a soldier to drive or operate a vehicle.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *A study has shown a reduction in accident rates of 22%. This has also proven that training times are three times faster than traditional methods.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *Yes, before using a simulator, the soldier must attend classroom training and fixed based computer training. After showing proficiency they are then put through full motion simulation. Proficiency must also be proven behind-the-wheel of the actual vehicle.*
5. What is the duration of your simulation training? *It depends on the vehicle. One must show 80% proficiency before moving on.*
6. Can simulation change attitude as well as behaviors? *Yes, we have shown that we can change behaviors and modify attitudes.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *No. We have found that simulation is an adjunct to actual behind-the-wheel training.*

8. How did you choose your simulation vendor? *Because we are all taxpayers, we piggybacked on a Marine sim program. The size of the simulator was a factor. Some simulator vendors needed a huge building. Buildings are a premium in the Army. It comes down to price and reputation.*
9. What is the cost of your simulation program? *I have no idea how many 100 millions the Army has invested in simulation. At Fort Leonard Wood, we have 32 Marine simulators and 52 Army simulators. The building alone cost 15 million.*
10. What qualities do you look for in a trainer/instructor? *We really don't have much choice. We have to take what the Army gives us.*
11. What are the positives of your simulation program? *We have reduced accidents, and saved money. We are able to simulate what we can't reproduce in the real world. The cost of running five simulators is about \$90 an hour; this saves the Army some real money.*
12. What are the negatives of your simulation program? *Probably the motion sickness that some soldiers get. The second negative is the over confidence. Most of the people coming through the simulator are 18-24 year old kids. They think that the simulator is a video game. No matter what they do in the sim, they can just re-set it and start over. I would rather humble them in the sim than see them get hurt in the real vehicle.*

## Appendix D

### Interview Questions for Industry and Fire Departments

Date: 9-1-06

Type of Interview: Phone

Name of Organization: FDNY EMS

Name of Interviewee: Rob Raheb

Number of Employees: 1000 Fire/3200 EMS

Position with Organization: LT/Paramedic  
EVOC trainer

Number of Stations/Plants: 30 stations/300  
Ambulances

1. How has simulation played a role in your organization? *It is huge for us. Every employee must come through the EVOC (Emergency Vehicle Operations Course). Our employees come from a very diverse population. They come from up-state New York as well as the five boroughs. For most of their lives, they only know mass transit. People can't afford cars, insurance or parking here in NY, so most have zero driving experience. We are going to give them a huge ambulance and tell them to drive it downtown NY. EVOC and simulation is a must.*
2. Is simulation training required in your organization? *Yes, and if they do not pass they get fired. We find that most new employees lack decision making skills, especially at intersections. We also simulate actually calls where the driver must use his radio; lights & sirens, reading a map and maneuvering through NY streets.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *Because of simulation, we have reduced all collisions by 12% and intersection training by 38%. Most of our accidents are from poor judgment such as sideswipes and broken mirrors.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *We train didactically for the first day. We do some pad training and then we train them for proficiency on the simulator. They must pass a 50 question exam or we do not employ them. They also learn vehicle ops as well as ambulance ops.*
5. What is the duration of your simulation training? *Our EVOC is a six day school. The 1<sup>st</sup> day is lecture. The 2<sup>nd</sup> and 3<sup>rd</sup> day we train on maneuvers on a pad such as straight driving, backing and left/right turns. On the 4<sup>th</sup> through the 6<sup>th</sup> day, we are on the simulator. Our simulator training is scenario based. We throw everything at them from soup to nuts. We only put 12 students through at a time.*

6. Can simulation change attitude as well as behaviors? *Yes we can. For those students who are not taking it serious, it shows on the simulator. We badger the student sim to try to get them frustrated. After we work them up, we can identify their weaknesses. It opens their eyes. We can duplicate and replicate the simulator training and then play it back for the student frame by frame. It is a bit humbling. We can also show the student the civilian point of view. We can show what the other driver saw. This has been great for our intersection accident prevention. The simulator is a tool, it is not the end all be all. The simulator is not a video game. If a current employee has 3 culpable accidents, we get with that employee and find out what is going on. We may have to modify some behaviors and we can do so with the simulator.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *No, but it does take the place of emergency driving. We can only perform non-emergency driving skills on the skills course.*
8. How did you choose your simulation vendor? *Price, reliability, technology. We follow what FDNY on the fire side started.*
9. What is the cost of your simulation program? *We actually have an E350 cut-away with a 3 way motion seat for realism. Our simulator cost \$350,000. We have one for EMS & one for fire.*
10. What qualities do you look for in a trainer/instructor? *They are all dedicated instructors. They first of all have to be NY State lab instructors with the Department of Health. They all want to be here. They love what they do.*
11. What are the positives of your simulation program? *Everything is positive. There is a definite cost savings and safety benefit.*
12. What are the negatives of your simulation program? *The 2 dimensional graphics create some depth perception. The next generation simulators are getting better graphics. Sometimes the brain does not recognize that it is a simulator, about 2% of the students get motion sickness.*

Appendix E  
Interview Questions for Industry and Fire Departments

Date: 9/5/06

Type of Interview: Phone

Name of Organization: NY City Transit

Name of Interviewee: Louis Maiello

Number of Employees: 9,000

Position with Organization: Superintendent  
Simulation Training

1. How has simulation played a role in your organization? *We train 800-1000 new employees a year. It would be impossible to put these kinds of numbers through quality training without simulation. It is hard to evaluate judgment, the simulator allows this. We want to make an impression on new employees their first two weeks on the job, the simulator allows us to do this. We want employees to make their mistakes in a non-risk environment. If you are going to have an accident, have them on the simulator and not on the street. We have found that we retain more employees with the simulator.*
2. Is simulation training required in your organization? *Every bus operator in our fleet has been on our simulators. We look at our accident statistics and we build curriculum and simulation models around them. When we have a problem scenario, we require all employees to spend some time on the simulator.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *We initially had a large number of right side turning accidents. We reduced our accidents by 33%. Students that have had right-side turning simulation training have had no right side turning accidents. It may take 3-4 years to get all drivers back through the simulator. Our top accident problems change every year because we are stopping accidents through simulation. Today we are having problems hitting pedestrians while entering bus stops. We are currently writing scenarios to simulate this. It is nice to see that our problems change from year to year because it shows we are solving our problems.*
4. Do your simulation scenarios require any prior instruction either classroom or computer-based before using the simulator? *We first teach the students basic skills and then we simulate it before allowing them go out in the real world. Just before we put a new employee on the street, they are given one last scenario on the simulator. One required class that every new student must conquer is how to use your mirrors. We simulate the proper adjustment and how to read what you see in your mirrors.*

5. What is the duration of your simulation training? *The first day of training is in the classroom. By the 2<sup>nd</sup> & 3<sup>rd</sup> day, they are on the simulator. Every new employee must attend ten simulation trainings. The trainings usually last ten minutes to a max of 30 minutes. We do not allow more than two 30 minutes sessions in a day. If by the 10<sup>th</sup> simulation training the student does not pass, the student is cut and resigns. It is important to make sure that the simulation training is considered serious and is managed all of the time.*
6. Can simulation change attitude as well as behaviors? *Absolutely! We have a P & E (performance & evaluation) program. After an assessment of a driver's performance, we see some patterns that need correction. We call these drivers in and put them on the simulator to try to find out what is going on. Sometimes is just something simple, such as adjustment of mirrors. Every operator needs their 19A operator certificate. The State of New York relies on us to make sure that we review all drivers. Every second year a driver is required a road test. We find things on these road tests that require extra training; much of it in a simulator. On unscheduled training days, our instructors go out in the field to observe behavior problems.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *Simulation does not take the place of behind-the-wheel time, it is a supplement*
8. How did you choose your simulation vendor? *Price and reliability was one factor. We had a problem finding a simulator vendor that would provide the package that we wanted. Our simulator vendor needed to simulate side mirrors. Only one would do so.*
9. What is the cost of your simulation program? *We have 4 simulators at the cost of \$350,000. It is a fixed seat simulator. It is a basic development tool.*
10. What qualities do you look for in a trainer/instructor? *We are not looking for people with a resume. We only want people with the passion to train drivers. If we get an instructor that says they want to give it a try, we don't take them. They need to be good with people. I love people who tell me that they want my job.*
11. What are the positives of your simulation program? *The ability to make mistakes on the simulator and not in real life. We can put drivers in situations that we cannot replicate in real life.*
12. What are the negatives of your simulation program? *This is not a toy! If you do not have a proper simulator indoctrination program, then don't let people train on it. The time on the simulator must be managed. Simulator discomfort is the main negative of a simulation program. Three ways that we overcome this discomfort are: Excessive Over Steer, Speed, and Fixed Stare*

## Appendix F

### Interview Questions for Industry and Fire Departments

Date: 9-7-06

Type of Interview: Phone

Name of Organization: Los Angeles FD

Name of Interviewee: Captain  
Frank Espinosa

Number of Employees: 3500

Position with Organization: Driver  
Training Instructor

Number of Stations/Plants: 104 Stations

1. How has simulation played a role in your organization? *It is gaining a full head of steam. We had a big accident in June that has put even more emphasis on drivers training. Simulation is a big part of that. We have a 16 hour EVOC program. Simulation is part of the curriculum. We also use simulation for driver modification. Drivers training was a topic of our Stand Down for Safety.*
2. Is simulation training required in your organization? *All new employees are required in our EVOC program. Every employee will make it through our simulator every three years. If we have a driver who is having accidents, we run them through the simulator to access behavior.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *It is too early to tell. We just got our simulator in February. We run 1300 to 1400 calls a day. We only have 250-280 accidents a year. It is too premature to say if simulation is making a difference. We think it does.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *We require a lecture, hands on as well as simulation. It is all scenario based.*
5. What is the duration of your simulation training? *Total time on the simulator for the EVOC program is about four hours. We have 15 different scenarios with some variations. Many of them are framed from actual accidents that we have had.*
6. Can simulation change attitude as well as behaviors? *Yes, the big factor is who the instructors are. We try to keep it to 10-12 students. Many of the older drivers don't see the value of simulation as much as the younger drivers. If we see poor attitudes, we can change that in the simulator. We can humble a driver in the simulator.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *It supports the behind-the-wheel time, but will never replace it. You cannot duplicate the sights, sounds or feel of a real fire truck. The simulator can*

- give real life training that we cannot replicate on the pad, such as blow outs, braking systems and the environment.*
8. How did you choose your simulation vendor? *Reliability of the vendor. The reputation and past clients are important.*
  9. What is the cost of your simulation program? *We have 4 simulators that cost about 5 million dollars.*
  10. What qualities do you look for in a trainer/instructor? *They must have passion for the job! They must have past experience as well as a good record. Passion is a must.*
  11. What are the positives of your simulation program? *We can replicate what we can't do in the field. We can load scenarios that replicate the actual accident. We can play it back and learn frame by frame what could have been done to prevent the accident. Again, passionate instructors.*
  12. What are the negatives of your simulation program? *Older drivers have not taken to the simulator. Motion sickness is a problem, especially due to the slow refresh rate of the screen. The refresh rates are getting better. We keep the room a bit colder at 65 degrees which helps. We limit the time on the simulator to around two-three minutes and then we get them off.*



## Appendix G

### Interview Questions for Industry and Fire Departments

Date: 10/16/06

Type of Interview: Phone

Name of Organization: Clark County FD  
Las Vegas

Name of Interviewee: Mike Johnson

Number of Employees: 700 Paid/350 Vol.

Position with Organization: Driver Trainer    Number of Stations/Plants: 26 Urban

1. How has simulation played a role in your organization? *This is one of the best things we have done. All new drivers must take simulation training as a part of their academy. It allows the department to simulate an environment that you can't do in real life. The students know the material, but when it comes time to multi-task, it is another thing. The scenarios are digitally recorded, so we can play it back as a tool. We record reaction time, as well as braking and acceleration. It allows us to train drivers on a Code 3 run that we couldn't duplicate in real-life.*
2. Is simulation training required in your organization? *Every driver/operator must pass simulation training before they are allowed to drive.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *Nothing scientifically. We have had a two year drop in accidents. We feel it is due to the simulator, but the trend is downward.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *Our driver program is a ten week program. Basics are taught in a classroom, with many power point presentations. We follow it with didactic training on an outside course. We then put them on the sim. We throw confliction into the scenarios. We can add buildings, traffic, rural & urban driving, to see how they react.*
5. What is the duration of your simulation training? *We limit it to 5-10 minutes on the simulator, but limit it to one hour a day each.*
6. Can simulation change attitude as well as behaviors? *Yes definitely! Our issues are with multi-tasking that drivers are required to perform. It is a wake-up call to current drivers and it is an eye opener to our new students. We have a program to run problem drivers through, but we have not yet.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *No you need both. Simulation cannot re-create the vehicle dynamics*

*issues that we get outside in a real truck. I'm sure sometime down the road, the simulators we be as real as the real thing.*

8. How did you choose your simulation vendor? *The cost was a huge issue. The scenario building software of L3 was easier than the others. The pictures of the equipment on the screen are actually pictures of our equipment. That was good for buy in.*
9. What is the cost of your simulation program? *\$124,000*
10. What qualities do you look for in a trainer/instructor? *Willingness to teach and they must be excited about it.*
11. What are the positives of your simulation program? *You are able to simulate what you can't do outside in a real truck. You are able to test a student's reactions in a Code 3 environment with multi-tasking going on, but without the safety problems.*
12. What are the negatives of your simulation program? *Cost is a negative. The only other is nausea. If a student's eye prescription is not correct, that causes it. We are careful to keep the temperature at 75degrees.*

## Appendix H

### Interview Questions for Industry and Fire Departments

Date: 8/21/06

Type of Interview: Personal

Name of Organization: Max Jet Airways

Name of Interviewee: Chris Galton

Number of Employees: 250

Position with Organization: Lead Captain

Number of Stations/Plants 3

1. How has simulation played a role in your organization? *It is used for the complete training of the flight crews. Simulating: engine failure, fires, loss of hydraulic pressure, loss of gear, loss of cabin pressure. Things that you can't do in the air with a real aircraft are simulated. The cockpit is identical to that of a real airplane. The simulator is full motion on 8 axis.*
2. Is simulation training required in your organization? *Yes. All training prior to actually flying a real plane is done in a sim. The first time that he actually flew the 757 was for his check ride. The next time was with passengers.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *ALPA (Airline Pilots Association) has statistics that show a decrease in accidents due to full motion simulators.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *There is a full classroom lecture followed by computer based learning. After that, then we are allowed in the sim.*
5. What is the duration of your simulation training? *For us it is an eight hour day, four hours in each seat (pilot/co-pilot).*
6. Can simulation change attitude as well as behaviors? *Yes, it can be very humbling. The instructor can pull the cockiness out of a pilot or build confidence. Attitudes are checked in a sim before we are allowed in a real aircraft.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *We are living proof that simulation can take the place of stick-time. The first time that I flew a real 757 was on my check ride.*
8. How did you choose your simulation vendor? *Boeing our aircraft provider has the sims. We buy time. The sims are in Seattle, Miami, Denver and France.*

9. What is the cost of your simulation program? *A simulator for the aircraft is 30-40 million, depending on type. Remember that our sims react, look, feel and sound like the real plane. The cost is around \$900/minute.*
10. What qualities do you look for in a trainer/instructor? *They must be genuine, knowledgeable, but must have teaching characteristics. They must differentiate between a pilot having difficulty vs. a pilot being cocky. It is very tedious and the burn-out is high. That is why they switch between a sim instructor and a check pilot.*
11. What are the positives of your simulation program? *There are 600 different scenarios. We can simulate the low frequency/high risk maneuvers. In a simulator we can duplicate any emergency situation that we cannot perform in an actual airplane. If you crash the simulator, no one dies or aircraft lost.*
12. What are the negatives of your simulation program? *There are not many. One that comes to mind is that there is some spatial disorientation with your surroundings. There is some motion sickness on some earlier generation simulators. Some of the graphics are not perfected.*

## Appendix I

### Interview Questions for Industry and Fire Departments

Date: 9-1-06

Type of Interview: Personal

Name of Organization: Great Lakes  
Maritime Academy

Name of Interviewee: Bob Mason

Number of Employees:

Position with Organization: Deck Instructor Number of Stations/Plants: One

1. How has simulation played a role in your organization? *Our two vessel simulators and 6 radar simulators prepare cadets for jobs at sea. We use them to introduce a task and reinforce the lecture. It also simulates other river and harbor traffic that the cadets have to learn to navigate. We also measure their reactionary times to obstacles that we throw at them. A crash with a real life freighter would be catastrophic.*
2. Is simulation training required in your organization? *Yes, it is part of the curriculum. All six state maritime academies as well as the 1 federal academy all have simulator similar to ours. We measure steering maneuvers as well as steering commands. Two courses are nothing but simulator courses.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *No. Some of the large Great Lakes carriers have simulators and they might be able to get you that data.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *We start out any simulator training with a lecture. The student must prepare a passage plan and then he/she is tested on that plan in the simulator.*
5. What is the duration of your simulation training? *Usually a hour to a hour and a half.*
6. Can simulation change attitude as well as behaviors? *Yes, we see it all of the time. If we have someone who thinks this is a game, we can humble them. All simulation time must be considered serious and not a video game.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *No. We do not have the full motion and realistic simulator as the airline industry does. We require a passing grade in the simulator before we allow anyone behind-the-wheel.*

8. How did you choose your simulator vendor? *The maritime industry does not have many simulator vendors. We rely on vendors that produce simulators for the Navy. Price and capabilities weight into the decision.*
9. What is the cost of your simulation program? *7 million dollars*
10. What qualities do you look for in a trainer/instructor? *Our instructors know all aspects of operating and navigating a vessel. We spend time out on the Great Lakes during the summers. Instructors need to have a love of the job and the love of instructing.*
11. What are the positives of your simulation program? *The cost of simulators is far less than what it would cost to actually sail a ship. The maneuvers we ask our cadets to perform, we could never do it in a real ship. The chance of a grounding or severe damage is too great. For the most part everything is very positive.*
12. What are the negatives of your simulation program? *You must have a specific goal in mind for every event. Some students think this is a video game. Every student must be serious about their training. Another negative is the realism. The maritime simulation companies have not kept up with the advances that other simulator companies have. There is some motion sickness.*

## Appendix J

### Interview Questions for Industry and Fire Departments

Date: 8-4-2006

Type of Interview: Personal

Name of Organization: Michigan Center for  
Truck Safety

Name of Interviewee: Mike Irwin

Number of Employees: 5

Position with Organization: Project Director Number of Stations/Plants: 1

1. How has simulation played a role in your organization? *Simulation is new to our organization. We are going to use it to supplement our skid pad training. It is going to be mobile, so we are going to take it to the trucking industry. Our statistics have shown that organizations with facilities over 37 miles from our skid pad do not participate. We plan on bringing the training to them. We plan on scenarios such as decision driving, shifting, speed management, space management, adverse conditions, and emergency maneuvers. We use the PAFI acronym in developing a program. Perceive the problem, analyze the problem, formulate a solution, and then initiate a program.*
2. Is simulation training required in your organization? *No, it is voluntary to Michigan's trucking industry.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *Not yet, but the trucking industry is using driving simulation extensively. Carriers such as Bison and Schneider have impressive statistics already. Schneider has closed their skid pad in Green Bay and has opened up simulation centers across the country. We hope that with the use of simulation, we can realize a reduction in Michigan's trucking crashes.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *We are going to use what we call the "circle of influence." There will be instructor led training, computer based training and a set of simulation scenarios developed specifically for the learning objectives. There is what we will call the "training sweet spot" which is a blend of all three. We call it the tell you, show you, and then you show me.*
5. What is the duration of your simulation training? *Behind the simulator, the training will be only 15 minutes. Each teaching scenario will last not more than an hour. This will include instructor-lead, computer based and then an actual simulator scenario.*

6. Can simulation change attitude as well as behaviors? *Attitudes are hard to change. Behaviors can change with trained responses. If you don't correct a behavior, you will continue doing it the same way. If you react to traffic situations you will continue to have close calls. With training, you can respond to traffic. This response will be from analyzing the situation and then developing a plan well before it becomes a problem.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *No, simulation is not a silver bullet. I still feel that you need a combination of classroom, computer based, simulation and then stick-time.*
8. How did you choose your simulation vendor? *It was based on a number of factors. We chose L3. With L3, there will not be as much development costs. L3 has already prepared curriculum for both instructor lead, computer based and scenario based simulation. I was impressed with their development and the fact that their simulation was so realistic. L3 has a high refresh rate. Of course, cost came in to play as well.*
9. What is the cost of your simulation program? *The cost of our program will be \$400,000. It will include a trailer, 2 simulation stations and 4 computer based stations.*
10. What qualities do you look for in a trainer/instructor? *The instructor needs enthusiasm. He also must be safety minded and also know the ins and outs of each scenario. The instructor must buy into the circle of influence.*
11. What are the positives of your simulation program? *We will be able to bring world class simulation to every part of Michigan. Companies that cannot afford to send drivers to us, we can come to them. We are able to reduce trucking company's labor cost. We are able to simulate the high-risk maneuvers that are low frequency.*
12. What are the negatives of your simulation program? *There is no research that says that simulation does not work. The cost of getting into simulation is a huge factor. A negative is the fact that some people get sick. That is why we keep the time on the simulator to only 15 minutes. As the refresh rate on the screen improves, sickness should be reduced. A big negative is the students' attitude. This is not a video game, there is no slot for quarters and there is no bonus round. The instructor must always present the simulation training as a challenge. Technology changes, that is why we have bought into the maintenance contract which will bring us yearly updates to the program. We know that we will probably have to change the plasma TV's every eight years.*



## Appendix K

### Interview Questions for Industry and Fire Departments

Date: 10/16/06

Type of Interview: Phone

Name of Organization: Ventura County FD

Name of Interviewee: Capt. Tom Glauser

Number of Employees: 400

Position with Organization: Driver Trainer

Number of Stations/Plants: 31

1. How has simulation played a role in your organization? *We have had simulation since 2001. Ours is in a mobile 48 foot trailer. We take the training to the users. Inside are 2 cabs and a chiefs vehicle. We are currently working on an upgrade where one of the units will be a tiller. Simulation is part of our drivers training program.*
2. Is simulation training required in your organization? *It is required as part of the academy. We use it to practice decision making. We do not have an EVOC program, but we follow the National Safety Council courses. All of our drivers must receive their CDL licenses. The simulator helps them prepare for that.*
3. Do you have any statistics on reduction of accidents or injuries due to simulation? *Nothing as of yet. We have had not any severe accidents, so there are not any statistics.*
4. Do your simulation scenarios require any prior instruction either classroom or computer based before using the simulator? *We have an orientation and then we put people on the sim.*
5. What is the duration of your simulation training? *Four hour blocks of time are set aside. The driver is only allowed five minutes on the simulator at a time.*
6. Can simulation change attitude as well as behaviors? *The simulator can humble drivers. Old behaviors can change. Older drivers have not taken to the technology as the younger drivers. Following too close is a behavior that we need to change. We have a policy in place for bad driving, but we are not using it.*
7. Can simulation take the place of behind-the-wheel or stick-time training for new employees? *It is an adjunct to wheel time. It will not replace actual behind-the-wheel training. There are things that each offer over the other.*
8. How did you choose your simulation vendor? *I don't know, it was here when I came here.*

9. What is the cost of your simulation program? *I don't know. I do know that it costs us about \$10,000 a year in maintenance fees to keep the system upgraded. We put aside money to upgrade all of the technology. You should budget for a complete upgrade in technology every five years.*
10. What qualities do you look for in a trainer/instructor? *They must be motivated and believe in the program. It is also necessary that they be computer literate.*
11. What are the positives of your simulation program? *It allows you to test and teach decision making. You are able to test Code 3 runs without the danger and safety concerns out on the street.*
12. What are the negatives of your simulation program? *It is still not the real thing. There is no way to simulate that. It is close. We have not made driving a priority, so that is why the simulator program is not a priority.*

## Appendix L

**Emergency Vehicle-Driving Simulator Questionnaire**

I appreciate you taking a few minutes to complete this questionnaire on driving simulation training. I am in my first year of the Executive Fire Officer program at the National Fire Academy. As part of the program, I am required to conduct research on a topic close to my department. As you may know, the Grand Traverse Metro Fire Department has written a grant for a vehicle-driving simulator. Your input will help advance my research on the effectiveness and implementation of a vehicle-driving simulation program. Please direct any questions or comments to Chief Pat Parker at [pparker@gtfire.org](mailto:pparker@gtfire.org) or (231) 922-4840. Thank You!

Please put a check mark in the box to answer the question.

1. What is your length of service with the Grand Traverse Metro Fire Department?

9	<input type="checkbox"/>	Less than 1 year
12	<input type="checkbox"/>	1-5 years
5	<input type="checkbox"/>	5-10 years
16	<input type="checkbox"/>	10-20 years
5	<input type="checkbox"/>	Over 20 years

2. What is your age?

10	<input type="checkbox"/>	18-25
6	<input type="checkbox"/>	25-30
12	<input type="checkbox"/>	30-40
9	<input type="checkbox"/>	40-50
10	<input type="checkbox"/>	Over 50

3. What sex are you?

44	<input type="checkbox"/>	Male
3	<input type="checkbox"/>	Female

4. Are you an officer with the department?

16	<input type="checkbox"/>	Yes
31	<input type="checkbox"/>	No

5. Have you ever used a vehicle-driving simulator besides video games?

15	<input type="checkbox"/>	Yes
32	<input type="checkbox"/>	No

6. Do you feel that simulation is an effective way to train for vehicle drivers training?

30 ☐ Yes  
 6 ☐ No  
 11 ☐ No opinion

7. If given the choice, how would you rather train for vehicle driving?

0 ☐ Classroom only  
 3 ☐ Hands on behind-the-wheel only  
 0 ☐ Vehicle simulation only  
 44 ☐ A combination of the above  
 0 ☐ None of the above

8. If vehicle driving simulation was part of our drivers training program, do you feel that training on the simulator should be mandatory?

32 ☐ Yes  
 7 ☐ No  
 8 ☐ No opinion

9. How often should you train on the simulator?

22 ☐ Once a year  
 19 ☐ Twice a year  
 4 ☐ Monthly  
 2 ☐ Never

10. When training on the simulator, how long should the session be?

5 ☐ More than one hour  
 17 ☐ One hour  
 15 ☐ One half hour  
 1 ☐ Fifteen minutes  
 9 ☐ No opinion

11. Do you feel that members should be paid to train on the simulator

19 ☐ Yes  
 15 ☐ No  
 13 ☐ No opinion

12. Should the simulator only be used for new or problem drivers or should every

driver train on the simulator?

4 ☐ Only new or problem drivers  
 41 ☐ Every driver should train on the simulator  
 2 ☐ No opinion

13. Do you feel that members with lights and sirens on their POV's, should be required to train on the simulator before using?

37	<input type="checkbox"/>	Yes
2	<input type="checkbox"/>	No
8	<input type="checkbox"/>	No Opinion

Thank you for your time. Please forward this back to Chief Parker.

Appendix M

Michigan Association of Fire Chief's Questionnaire  
MAFC Annual Leadership Conference  
August 23-25  
Bay City, MI

I appreciate you taking the time to complete this questionnaire on vehicle driving simulation. I am in my first year of the EFO program at the NFA. Your input will help advance my research on the effectiveness and implementation of a vehicle driving simulation program. Please direct any questions or comments to Chief Pat Parker at pparker@gtfire.org or (231) 922-4840. Thank You!

1. What is the name of your Department?
2. What is your name and position with the Department?
3. What is your staffing type?
4. How many members do you have?
5. Do you have a drivers training program in your Department?
6. Do you include vehicle driving simulation in your drivers training program?
7. If not, why not?
8. What do you think are the factors that prohibit fire department's from acquiring a vehicle driving simulator?
9. If the training was offered on a regional basis, would you participate in a vehicle driving simulator?
10. Would you be willing to help defray the cost of maintenance and technology upgrades? If so, to what amount?
11. Do you know if Vehicle Driving Simulators qualify for grants under the AFG?
12. Do you feel that a vehicle driving simulator could benefit your department?